interesting results. All parts of *Coprinus* and other fungi exhibit distinct polarity, so that when parts of stems or pilei are grafted in their normal position on the corresponding parts of other individuals used as stocks, union readily takes place by anastamosing of the hyphae. When the part used as the scion is inserted in the reverse position, no union takes place. In partly resupinate forms, like *Polystictus*, polarity was exhibited in the same sense, but portions near the margins showed polarity to a less degree than the older parts.—H. HASSELBRING.

Lagenostoma.—This paleozoic type of seed, the first to be connected with Cycadofilicales, has been investigated further by Miss PRANKERD[16] from preparations of *L. ovoides*. The *Lagenostoma* type of seed has peculiarities that are hard to relate to the structures of the more modern gymnosperm seeds, and any additional knowledge of the facts is welcome. The structures revealed by these new preparations are described in detail, and some interesting "theoretical suggestions" are made. The seed investigated strengthens the suggestion of OLIVER and SCOTT that the outer fleshy layer of the cycadean testa represents the cupule of *Lagenostoma*, the stony layer being developed after fusion of the *Lagenostoma* integument with the cupule. The method of pollination is discussed also, and the curious supposition that extraneous water must be brought to the pollen chamber for the swimming sperms is continued. The facts in reference to the peculiar "crevice-like" pollen chamber are somewhat cleared up. It is shown that the contact of the "central cone" with the outer layer of the nucellus is quite variable, so that apparent continuity might be developed in a variety of ways. The point of this is that a preparation showing a space below and continuity aboves does not prove necessarily that the pollen chamber is being formed from below upward. In certain specimens this very appearance was observed and yet there were pollen grains in the chamber. It is not even certain that the crevice-like chamber was continuous around the central cone. The specialized apical portion of the nucellus is called the "lagenostome," and the suggestion as to its morphology is very interesting. Miss PRANKERD sees in it a modified apical annulus, which in the fossil *Seftenbergia* is a multiseriate structure, but which in living forms has become simpler. If this be true, we have a fern connection for the structure that seemed to be hopelessly advanced, namely the seed.—J. M. C.

The foliar ray of dicotyledons.—BAILEY[17] has followed up his previous work on the rays of certain groups by a more comprehensive study of the dicotyledons, resulting in some important conclusions. The primitive angio-

[16] PRANKERD, THEODORA L., On the structure of the paleozoic seed *Lagenostoma ovoides* Will. Jour. Linn. Soc. London **40**:461–490. *pls. 22–24. figs. 3.* 1912.

[17] BAILEY, IRVING W., The evolutionary history of the foliar ray in the wood of the dicotyledons, and its phylogenetic significance. Ann. Botany **26**:647–661. *pls. 62, 63.* 1912.

sperms, possessing a siphonostele with strong development of secondary wood, had uniseriate or linear rays, such as characterize the conifers. During the warmer climate of the Mesozoic, "sheets of storage tissue were built up from congeries of uniseriate rays about the persistent leaf traces of evergreen angiosperms. This primitive type of foliar ray has persisted in certain species of primitive families (Casuarinaceae, Fagales, etc.). Later changes in climate modified the storage conditions, and in the majority of living dicotyledons the aggregated units of foliar ray tissue have been diffused through the stem, and in general the evidence of their former relation to leaf traces has disappeared. In a small number of forms the primitive aggregate type has been "progressively compounded or solidified," and the result is the compound or multiseriate ray (deciduous oaks, etc.). In many families there has been a reversion to the primitive uniseriate condition. As a consequence, in the modern species the foliar ray of the primitive aggregate type has been or is being reduced, diffused, or compounded. The evidences of reduction are interesting and important in any scheme of classification. For example, *Castanea* and *Castanopsis* are reduced members of the oak family, and *Alnus mollis* and *A. acuminata* are reduced species of *Alnus*.

It is increasingly evident that the woody cylinder of angiosperms is very far from being a structure of phylogenetic simplicity.—J. M. C.

Bog vegetation.—In studying the various problems connected with the peat bogs of Ohio, DACHNOWSKI[18] has made a careful enumeration of the various plant associations involved, and traced the variously modified successions which occur. Fortunately he has not been content with observations, but has attempted various lines of quantitative study of the factors involved, such as the height and variation of the water table, the acidity of the soil, and the evaporating power of the air. He has also begun a series of chemical analyses of bog water and peat soils. The preliminary results[19] are valuable as being suggestive of lines for future investigation rather than as affording solutions for any existing problems. The chemical changes which take place in the transformation of vegetable matter into peat are only imperfectly understood, but as they are observed as exhibited in passing from the imperfectly formed fibrous material to the competely transformed structureless peat there is a relative loss of oxygen and hydrogen and an increase of carbon and nitrogen simultaneously with an increase in the reducing processes in the soils. The complexity of the problem of relating the vegetation to the chemical nature of the substratum is indicated, as well as the possible importance of the decomposition products of proteids and carbohydrates that are now beginning to be isolated and identified.—GEO. D. FULLER.

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[18] DACHNOWSKI, A., The succession of vegetation in Ohio lakes and peat deposits. Plant World **15**: 25–39. 1912.

[19] ———, The relation of Ohio bog vegetation to the chemical nature of peat soils. Bull. Torr. Bot. Club **39**: 53–62. 1912.